US009346271B2

(12) United States Patent
Kobayashi et al.

(10) Patent No.: US 9,346,271 B2
(45) Date of Patent: May 24, 2016

(54) **LIQUID EJECTING HEAD**

(71) Applicant: **Seiko Epson Corporation**, Tokyo (JP)

(72) Inventors: **Hiroyuki Kobayashi**, Azumino (JP); **Hiroshige Owaki**, Okaya (JP); **Toshinobu Yamazaki**, Niigata (JP); **Hiroyuki Hagiwara**, Matsumoto (JP)

(73) Assignee: **Seiko Epson Corporation** (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/751,949**

(22) Filed: **Jun. 26, 2015**

(65) **Prior Publication Data**

US 2016/0031210 A1 Feb. 4, 2016

(30) **Foreign Application Priority Data**

Jul. 29, 2014 (JP) 2014-153553

(51) **Int. Cl.**
B41J 2/165 (2006.01)
B41J 2/14 (2006.01)
B41J 2/16 (2006.01)

(52) **U.S. Cl.**
CPC ***B41J 2/1433*** (2013.01); ***B41J 2/165*** (2013.01); ***B41J 2/1623*** (2013.01); ***B41J 2/16508*** (2013.01)

(58) **Field of Classification Search**
CPC B41J 2/1623; B41J 2/162; B41J 2/16508; B41J 2/16505; B41J 2/155
See application file for complete search history.

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Primary Examiner — Geoffrey Mruk
(74) *Attorney, Agent, or Firm* — Harness, Dickey & Pierce, P.L.C.

(57) **ABSTRACT**

A liquid ejecting head includes a fixing plate which includes a bottom surface which is fixed onto the nozzle surface of each of a plurality of head units which are provided to line up in a state in which a first gap is formed along a first direction, and a first side surface which extends from an edge of the bottom surface which is positioned closer to an outside in the first direction than the lined-up head units to the head unit side. The fixing plate includes a second gap which is formed between the first side surface and the head units which are positioned at ends in the first direction among the head units. The liquid ejecting head also includes a second outer circumferential mold which fills at least a portion of the first gap, and a third outer circumferential mold which fills at least a portion of the second gap. The third outer circumferential mold fills the second gap at a position which is distanced further from the bottom surface than the second outer circumferential mold in a direction which is perpendicular to the bottom surface, and a hardness of the third outer circumferential mold is higher than a hardness of the second outer circumferential mold.

10 Claims, 7 Drawing Sheets

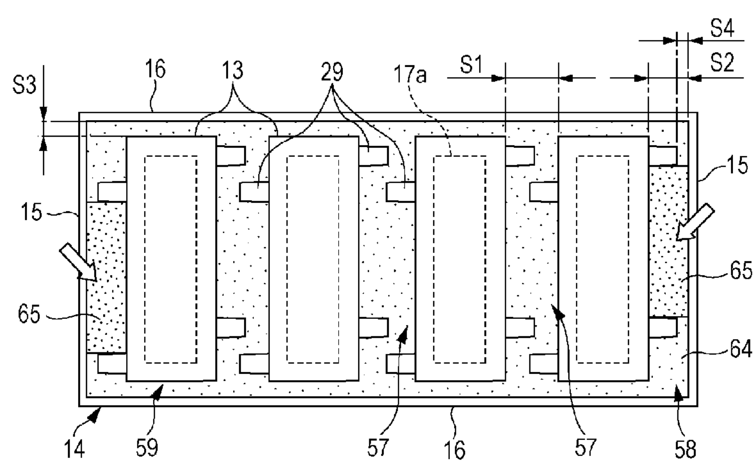

FIG. 1

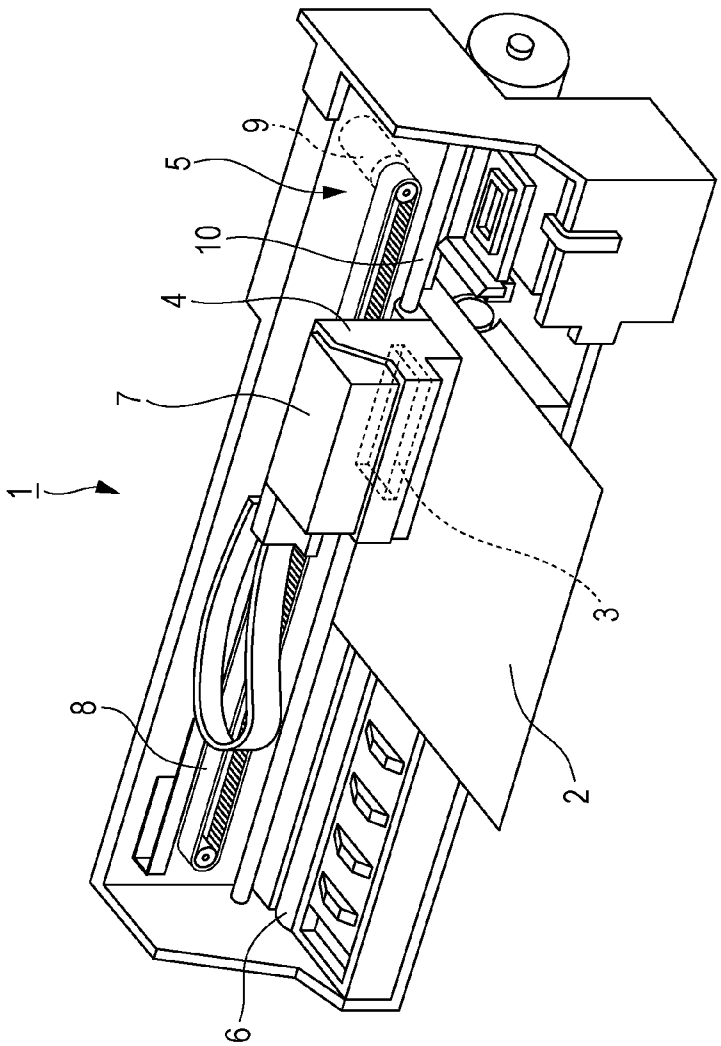

FIG. 2

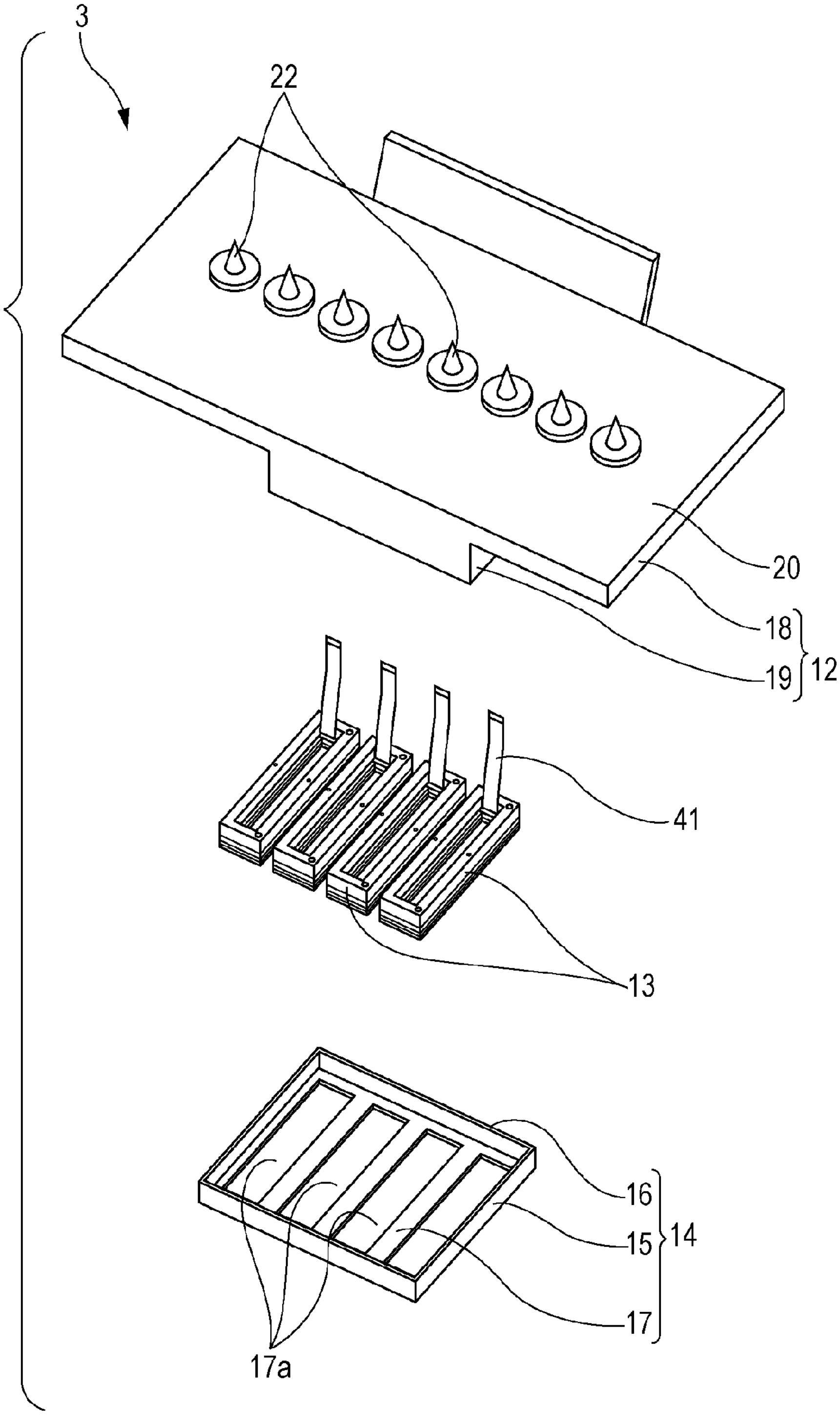

FIG. 3

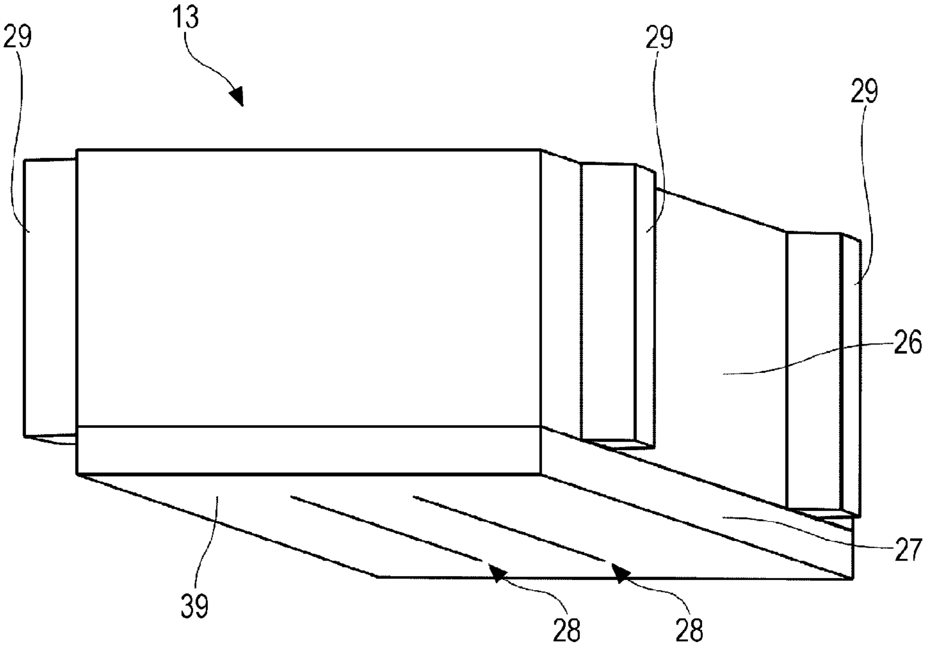
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FIG. 4

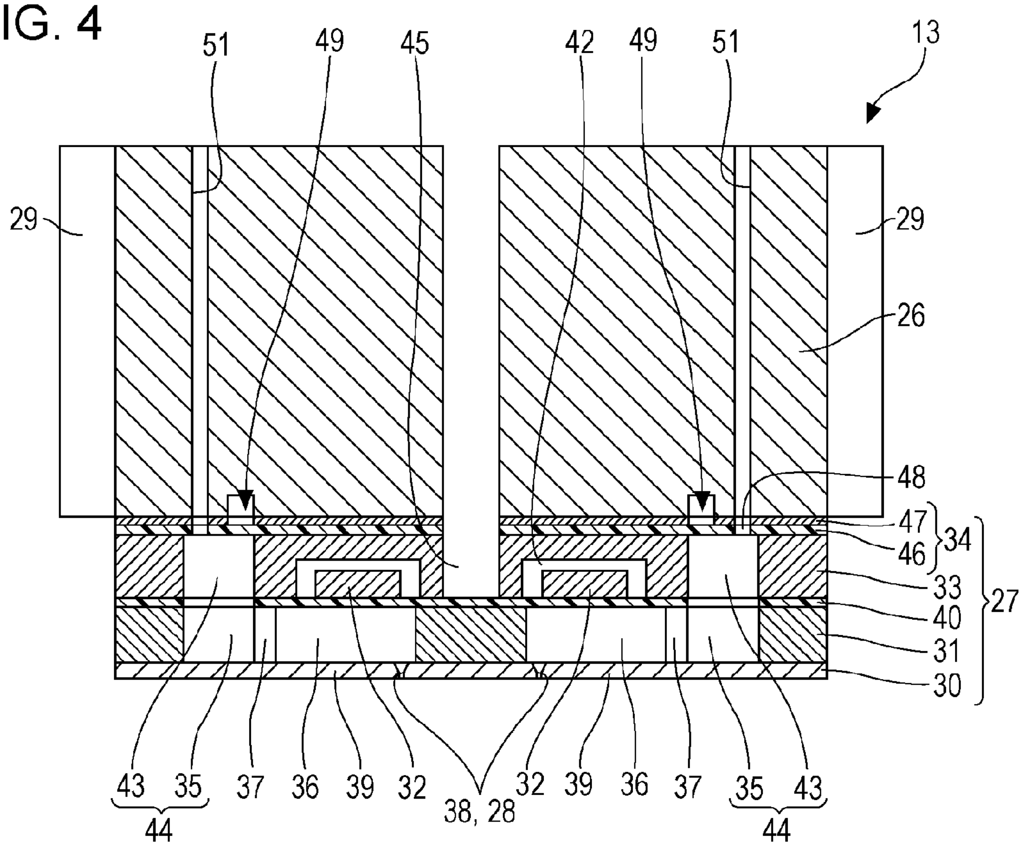
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FIG. 5

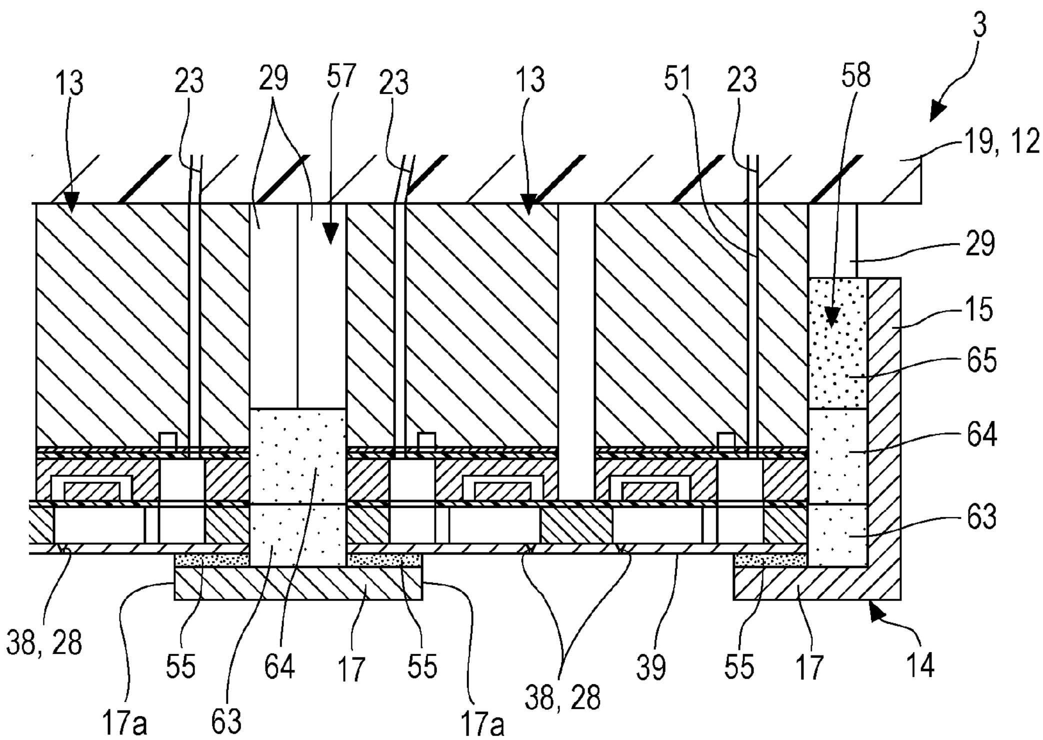
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FIG. 6A

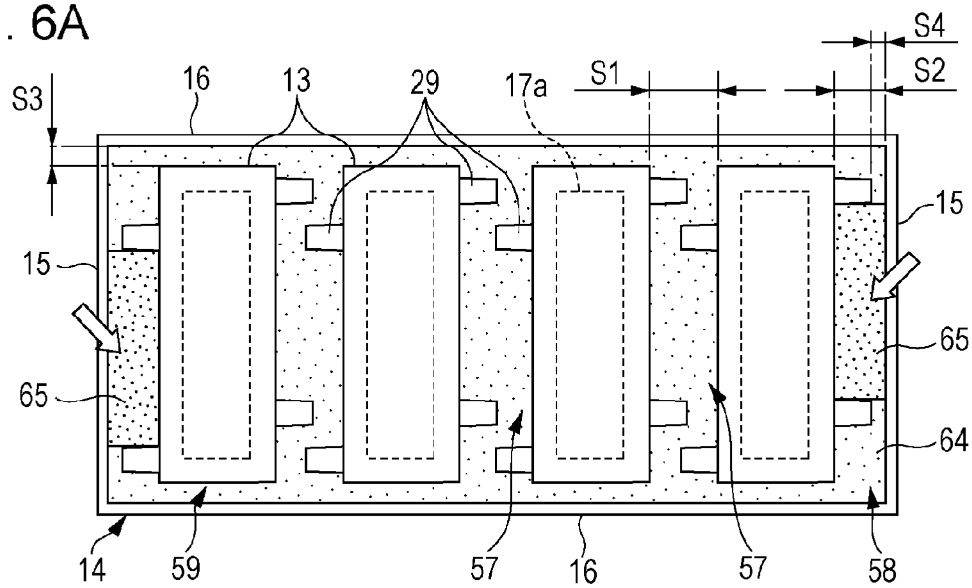

FIG. 6B

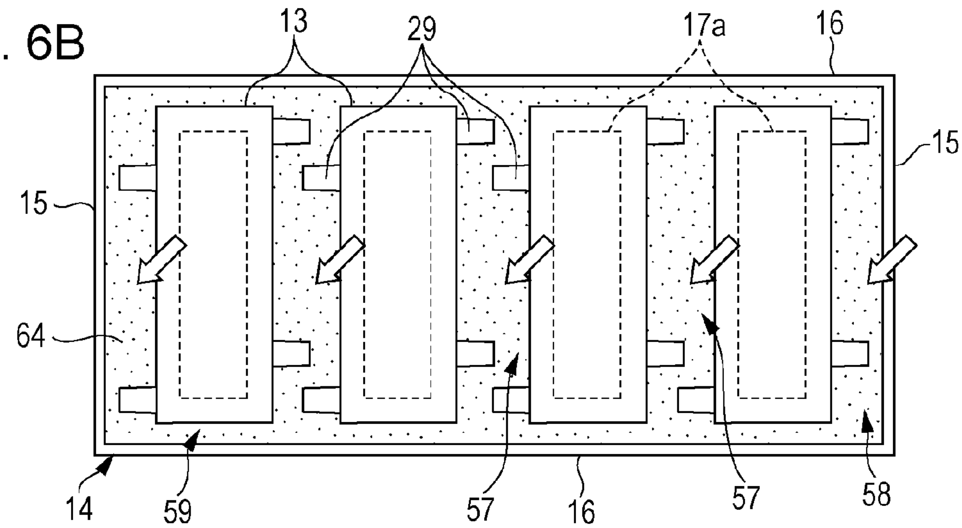

FIG. 6C

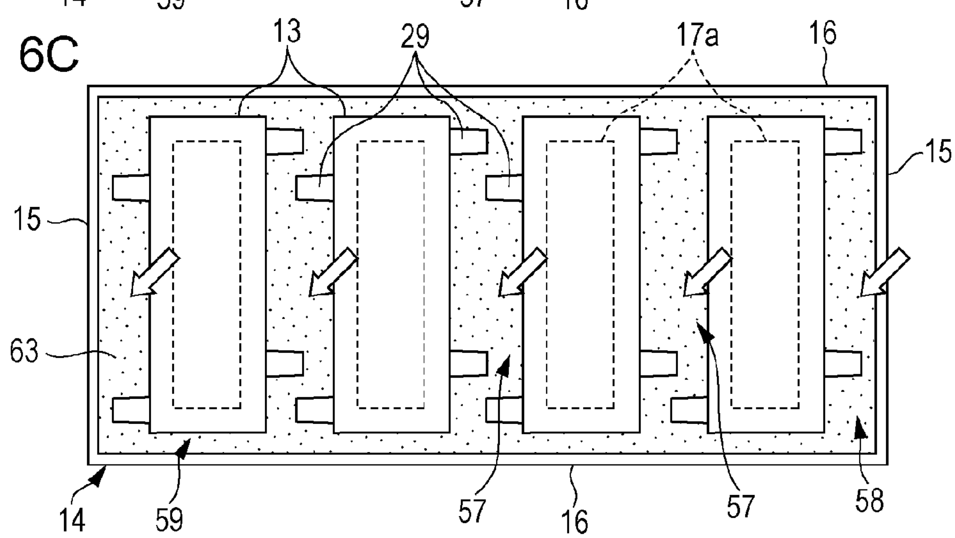

FIG. 7

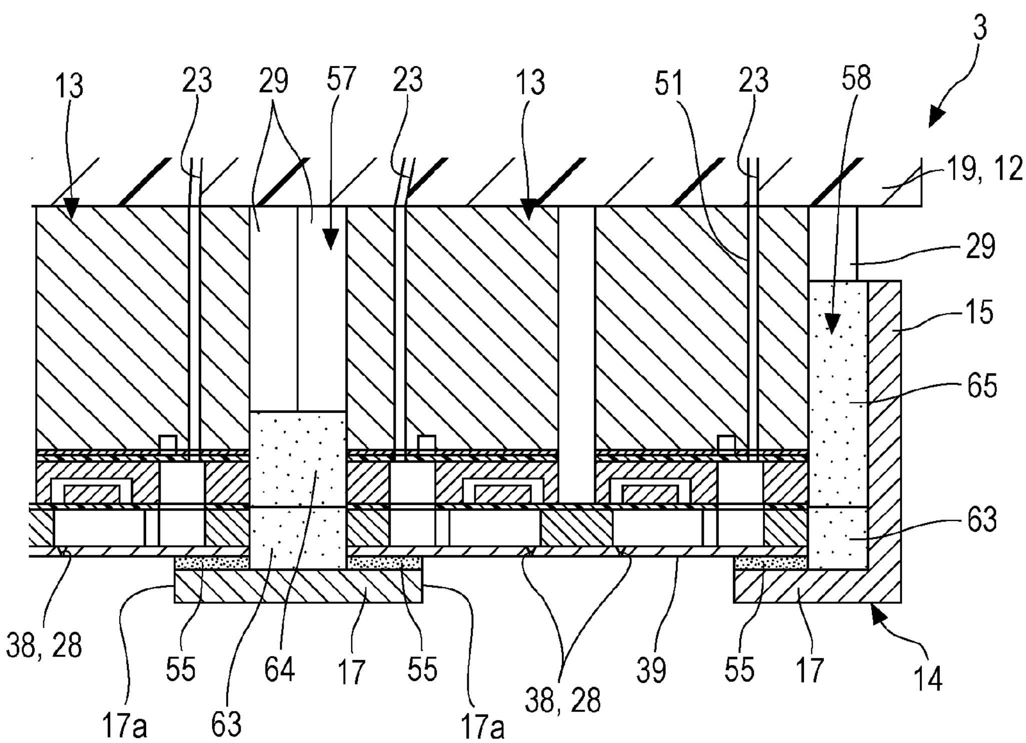
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FIG. 8A

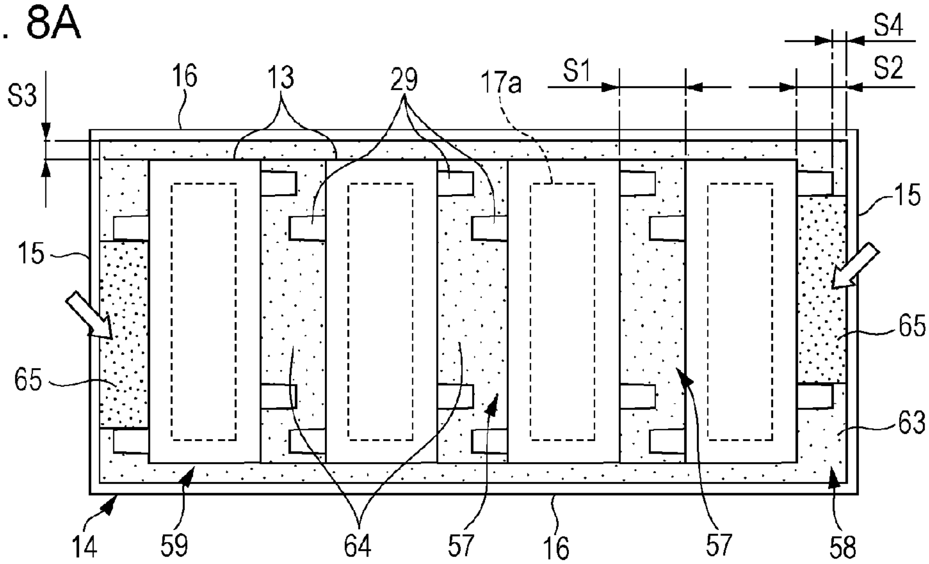


FIG. 8B

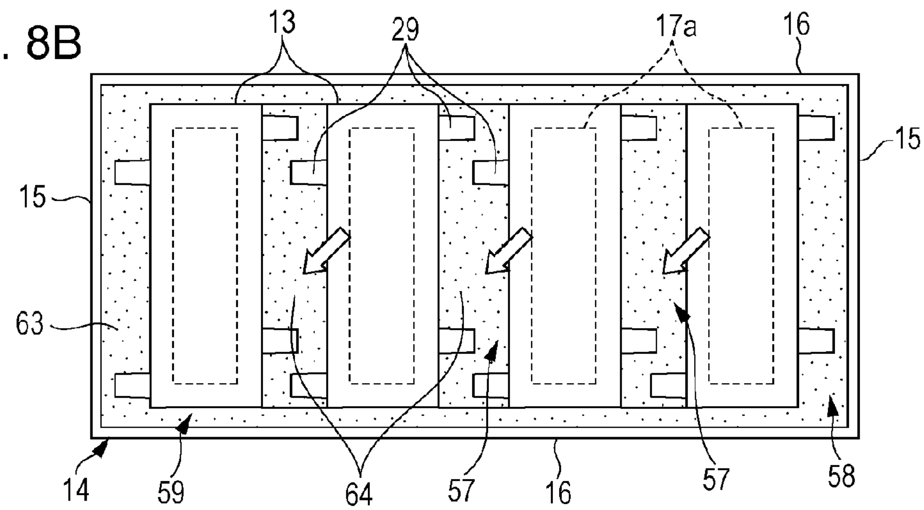
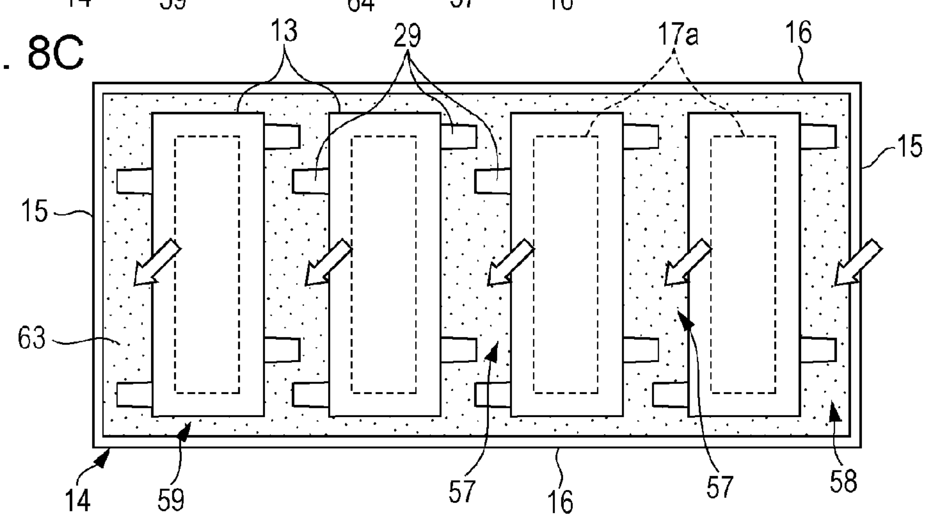


FIG. 8C



LIQUID EJECTING HEAD

CROSS REFERENCES TO RELATED APPLICATIONS

This application claims priority to Japanese Patent Application No. 2014-153553 filed on Jul. 29, 2014. The entire disclosures of Japanese Patent Application No. 2014-153553 is hereby incorporated herein by reference.

BACKGROUND

1. Technical Field

The present invention relates to a liquid ejecting head such as an ink jet recording head which is provided with a plurality of head units which eject a liquid from nozzles.

2. Related Art

An image recording head is an example of an ink jet recording head which is used in an image recording apparatus such as an ink jet recording apparatus; however, recently liquid ejecting heads are also being adapted for use in various manufacturing apparatuses, making use of the characteristic of being capable of causing extremely small amounts of a liquid to accurately land in predetermined positions. For example, the liquid ejecting head is being adapted for use in display manufacturing apparatuses which manufacture color filters of liquid crystal displays and the like, electrode forming apparatuses which form electrodes of organic electro-luminescence (EL) displays, face emission displays (FED), and the like, and chip manufacturing apparatuses which manufacture biochips (biochemical elements). In a recording head for an image recording apparatus, a liquid-state ink is ejected, and in a color material ejecting head for a display manufacturing apparatus, solutions of color materials for each of red (R), green (G), and blue (B) are ejected. In an electrode material ejecting head for an electrode forming apparatus, a liquid-state electrode material is ejected, and in a bio-organic matter ejecting head for a chip manufacturing apparatus, a solution of bio-organic matter is ejected.

Among the liquid ejecting heads described above, there is a liquid ejecting head which is provided with a plurality of head units which include a plurality of nozzles which are formed in a nozzle surface, a pressure chamber which is formed for each nozzle, and actuators such as piezoelectric elements which cause changes in pressure inside each of the pressure chambers. The plurality of head units are adhesively fixed to a fixing plate from the nozzle surface side. The fixing plate is formed such that the edge portion of the bottom surface to which the nozzle surface is fixed is folded to the head unit side and surrounds the head units. There is a liquid ejecting head in which a gap between the side surfaces of the head units and the side surfaces of the fixing plate which is folded along the side surfaces of the head unit is filled with plural separate layers of a filler such as an adhesive such that the hardness in the cured state increases approaching the bottom surface side of the fixing plate (for example, refer to Japanese Patent No. 5136752).

However, in the liquid ejecting head described above, since the hardness of the filler which fills the gap between the side surfaces of the head units and the side surfaces of the fixing plate is reduced the further the filler is from the bottom surface of the fixing plate, for example, when a recording medium collides with the side surfaces of the fixing plate due to a so-called jam in which a recording medium such as paper is jammed, the side surfaces warp easily. In particular, since a recording medium which is formed of a synthetic resin such as vinyl chloride has high rigidity and does not easily rip in comparison to paper, the force which is applied to the side surfaces of the fixing plate when the recording medium collides with the side surfaces of the fixing plate is great. When the side surfaces of the fixing plate warp due to the external force, stress arises in the bottom surface of the fixing plate. As a result, there is a concern that the nozzle surface which is fixed to the bottom surface will be damaged.

SUMMARY

An advantage of some aspects of the invention is to provide a liquid ejecting head capable of suppressing the damage to the nozzle surface.

Application Example 1

According to this application example, there is provided a liquid ejecting head which includes a head unit configured to eject a liquid from a nozzle which is formed on a nozzle surface, and a fixing plate. The fixing plate includes a bottom surface and a first side surface. The bottom surface is fixed to the nozzle surface of each of a plurality of the head units which are provided to line up in a state in which a first gap is remained along a first direction parallel to the nozzle surface, and the first side surface extends to the head unit side from an edge of the bottom surface which is positioned closer to an outside in the first direction than the lined-up head units. The fixing plate includes a second gap which is formed between the first side surface and the head units which are positioned at ends in the first direction among the head units. The liquid ejecting head also includes a first filler which fills at least a portion of the first gap, and a second filler which fills at least a portion of the second gap. The second filler fills the second gap at a position which is distanced further from the bottom surface than the first filler in a direction which is perpendicular to the bottom surface, and a hardness of the second filler is higher than a hardness of the first filler.

According to the invention, since the second gap is filled with the second filler which has a higher hardness in a position which is distanced further from the bottom surface, even if an external force is applied to the first side surface due to a collision or the like of the recording medium, it is possible to suppress the warping of the first side surface. Accordingly, it is possible to suppress the stress on the bottom surface which arises due to the warping of the first side surface, and it is possible to suppress the damage to the nozzle surfaces which are fixed to the bottom surface. Meanwhile, since the first gap is filled with the first filler which has a lower hardness, it is possible to suppress the deformation of the fixing plate and the head unit which is caused by the contraction force which arises when the liquid-state filler in the first gap cures to form the first filler. As a result, it is possible to suppress the misalignment of the head unit and the damage to the nozzle surfaces.

Application Example 2

In the liquid ejecting head according to application example 1, a maximum interval between the head unit and the first side surface in the second gap is narrower than a maximum interval between adjacent head units in the first gap.

In this case, since the second gap becomes narrower, it is possible to fill the second gap to a position which is distanced further from the bottom surface with the liquid-state filler due to the capillary force which arises when the second gap is filled with the second filler. Since the second gap is narrow, it is possible to reduce the warp amount even if the first side surface warps to the head unit side.

Application Example 3

In the liquid ejecting head according to application example 1 or 2, the fixing plate includes a second side surface which extends to the head unit side in a state in which a third gap is formed in a space from an edge of the bottom surface, which is positioned closer to an outside than the head unit in a second direction which is parallel with the nozzle surface and orthogonal to the first direction, to the head units, and a maximum interval between the head units and the second side surface in the third gap is narrower than a maximum interval between the head units and the first side surface in the second gap.

In this case, since the third gap is further narrowed, it is possible to reduce the size of the fixing plate in the second direction. Accordingly, it is possible to suppress the collision of the recording medium into the fixing plate, and thus, it is possible to suppress the damage to the nozzle surfaces.

Application Example 4

In the liquid ejecting head according to application examples 1 to 3, among the lined-up head units, at least the head units which are positioned at ends in the first direction include at least two adjacent ribs protruding toward the second gap to leave an interval in a second direction which is parallel with the nozzle surface and orthogonal to the first direction.

In this case, it is possible to define the filling range of the second adhesive in the second direction using the space between the ribs. Accordingly, when the second gap is filled with the second filler, it is possible to suppress the spilling over of the liquid-state filler to the outside of the filling range. As a result, it is possible to suppress the filling of the outside of the second gap with the second filler which has a high hardness and in which the contraction force which arises when curing is great, and it is possible to suppress the deformation of the fixing plate and the head unit which arises from the contraction force of the filler.

Application Example 5

In the liquid ejecting head according to application example 4, the head unit includes at least two ribs protruding outward from each side in the first direction to leave an interval in the second direction, and the ribs protruding from one side are formed to be shifted in the second direction in relation to the ribs protruding from other side.

In this case, it is possible to prevent the ribs of the adjacent head units from interfering with each other when the head units are lined up in the first direction. Accordingly, it is possible to reduce the size of the gap between the head units, and thus, it is possible to miniaturize the liquid ejecting head.

Application Example 6

According to this application example, there is provided a liquid ejecting head which includes a head unit which ejects a liquid from a nozzle which is formed on a nozzle surface, and a fixing plate. The fixing plate includes a bottom surface which is fixed onto the nozzle surface of each of a plurality of the head units which are provided to line up in a state in which a first gap is formed along a first direction parallel to the nozzle surface, a first side surface which extends from an edge of the bottom surface which is positioned closer to an outside in the first direction than the lined-up head units to the head unit side, and a second side surface which extends to the head unit side from an edge of the bottom surface which is positioned closer to an outside in a second direction which is parallel with the nozzle surface of the lined-up head units and orthogonal to the first direction. The fixing plate includes a second gap which is formed between the first side surface and the head units which are positioned at ends in the first direction among the head units, and is provided with a third gap between the second side surface and the head units. The liquid ejecting head also includes a first filler which fills at least a portion of the first gap, and a second filler which fills at least a portion of the second gap. A maximum interval between the head units and the second side surface in the third gap is narrower than a maximum interval between the head units and the first side surface in the second gap, and a hardness of the second filler is higher than a hardness of the first filler.

In this case, since the second gap is filled with the second filler which has a higher hardness, even if an external force is applied to the first side surface due to a collision or the like of the recording medium, it is possible to suppress the warping of the first side surface. Accordingly, it is possible to suppress the stress on the bottom surface which arises due to the warping of the first side surface, and it is possible to suppress the damage to the nozzle surfaces which are fixed to the bottom surface. Meanwhile, since the first gap is filled with the first filler which has a lower hardness, it is possible to suppress the deformation of the fixing plate and the head unit which is caused by the contraction force which arises when the liquid-state filler in the first gap cures to form the first filler. As a result, it is possible to suppress the misalignment of the head unit and the damage to the nozzle surfaces. Since the third gap is further narrowed, it is possible to reduce the size of the fixing plate in the second direction. Accordingly, it is possible to suppress the collision of the recording medium into the fixing plate, and thus, it is possible to suppress the damage to the nozzle surfaces.

Application Example 7

In the liquid ejecting head according to application example 6, among the lined-up head units, at least the head units which are positioned at ends in the first direction include at least two adjacent ribs protruding toward the second gap to leave an interval in the second direction.

In this case, it is possible to define the filling range of the second adhesive in the second direction using the space between the ribs. Accordingly, when the second gap is filled with the second filler, it is possible to suppress the spilling over of the liquid-state filler to the outside of the filling range. As a result, it is possible to suppress the filling of the outside of the second gap with the second filler which has a high hardness and in which the contraction force which arises when curing is great, and it is possible to suppress the deformation of the fixing plate and the head unit which arises from the contraction force of the filler.

Application Example 8

In the liquid ejecting head according to application example 7, the head unit includes at least two ribs protruding outward from each side in the first direction to leave an interval in the second direction, and the ribs protruding from one side are formed to be shifted in the second direction in relation to the ribs protruding from other side.

In this case, it is possible to prevent the ribs of the adjacent head units from interfering with each other when the head units are lined up in the first direction. Accordingly, it is possible to reduce the size of the gap between the head units, and thus, it is possible to miniaturize the liquid ejecting head.

Application Example 9

In the liquid ejecting head according to application examples 1 to 8, a space between the second filler and the bottom surface in the second gap is filled with the first filler.

In this case, since the second gap is filled with the first filler which has a lower hardness closer to the bottom surface side than the second filler, it is possible to further suppress the deformation of the fixing plate and the head unit which is caused by the contraction force which arises when the liquid-state filler in the second gap cures. As a result, it is possible to further suppress the misalignment of the head unit and the damage to the nozzle surface. Meanwhile, since the second gap is filled with the second filler which has a higher hardness in a position which is distanced further from the bottom surface than the first filler, even if an external force is applied to the first side surface due to a collision or the like of the recording medium, it is possible to suppress the warping of the first side surface. Accordingly, it is possible to suppress the stress on the bottom surface which arises due to the warping of the first side surface, and it is possible to suppress the damage to the nozzle surfaces which are fixed to the bottom surface.

Application Example 10

In the liquid ejecting head according to application example 9, the first filler is injected from the second gap to fill the first gap and the second gap.

In this case, since the liquid-state filler which forms the first filler is injected from the second gap and is allowed to flow to the first gap, it is possible to reduce the number of injection positions of the filler. As a result, the filling work of the first filler is simplified.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described with reference to the accompanying drawings, wherein like numbers reference like elements.

FIG. **1** is a schematic diagram illustrating the configuration of a printer.

FIG. **2** is an exploded perspective diagram of a recording head.

FIG. **3** is a perspective diagram of a head unit.

FIG. **4** is a cross sectional diagram of the head unit.

FIG. **5** is a cross sectional diagram of the main parts of the recording head in a first embodiment.

FIGS. **6**A to **6**C are schematic diagrams illustrating the formation positions of each outer circumferential mold in the first embodiment.

FIG. **7** is a cross sectional diagram of the main parts of the recording head in a second embodiment.

FIGS. **8**A to **8**C are schematic diagrams illustrating the formation positions of each outer circumferential mold in the second embodiment.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

Hereinafter, description will be given of embodiments of the invention with reference to the attached drawings. Note that, in the embodiments described hereinafter, there are various limits as favorable embodiments of the invention; however, the scope of the invention is not limited thereto as long as there is no wording particularly limiting the invention in the description hereinafter. Hereinafter, an ink jet printer (hereinafter simply referred to as a printer **1**) with an ink jet recording head (hereinafter simply referred to as a recording head **3**), which is a type of the liquid ejecting head, mounted thereon will be described as an example of the liquid ejecting apparatus of the invention.

First, description will be given of the configuration of the printer **1** in the present embodiment, with reference to FIG. **1**. The printer **1** is an apparatus which performs recording of an image or the like by ejecting a liquid-state ink onto the surface of a recording medium **2** such as recording paper or a film formed of a synthetic resin. The printer **1** is provided with a recording head **3**, a carriage **4**, and a carriage movement mechanism **5**. The recording head **3** is attached to the carriage **4**, and the carriage movement mechanism **5** causes the carriage **4** to move in the main scanning direction. The printer **1** is provided with a platen roller **6**, for example, as a mechanism which transfers the recording medium **2** in the sub-scanning direction. Besides the platen roller **6**, a drum or the like may be used as the transfer mechanism. Here, the ink is a type of the liquid in the invention, and is stored in ink cartridges **7** which serve as a liquid supply source. The ink cartridges **7** are detachably mounted to the recording head **3**. Note that, a configuration may be adopted in which the ink cartridges **7** are disposed on a main body side of the printer **1**, and the ink is supplied from the ink cartridges **7** to the recording head **3** through ink supply tubes.

The carriage movement mechanism **5** is provided with a timing belt **8**. The timing belt **8** is driven by a pulse motor **9** such as a DC motor. Therefore, when the pulse motor **9** is driven, the carriage **4** is guided by a guide rod **10** which is provided to bridge across the printer **1** and moves reciprocally in the main scanning direction (this corresponds to the first direction in the invention).

FIG. **2** is an exploded perspective diagram illustrating the configuration of the recording head **3**. FIG. **3** is a perspective diagram of a head unit **13**. FIG. **4** is a cross sectional diagram of the head unit **13**. FIG. **5** is a cross sectional diagram of the main parts of the recording head **3**. The recording head **3** in the present embodiment is formed by laminating a holder **12**, the plurality of head units **13**, a fixing plate **14**, and the like.

The holder **12** is a member formed of a synthetic resin and is provided with a needle holder **18** and a unit holder **19**. The needle holder **18** includes a cartridge mounting unit **20** into which each of the ink cartridges is mounted **7**. In the cartridge mounting unit **20**, corresponding to each color of the ink of the ink cartridges **7**, a total of eight introduction needles **22** are provided to stand in a line along the main scanning direction. The introduction needles **22** are hollow needle shaped members which are inserted into the ink cartridges **7** and introduce the ink which is stored in the ink cartridges **7** to holder flow paths **23** (refer to FIG. **5**) through needle flow paths (not shown). Note that, the configuration in which the ink is introduced from the ink cartridges **7** into the recording head **3** is not limited to the introduction needles **22**, and it is possible to adopt a configuration in which, for example, porous members capable of absorbing the ink are provided on the supply side and the receiving side of the ink, and the ink is transferred by bringing the porous members into contact with each other.

The unit holder **19** is a member to which the plurality of head units **13** is connected from below. In the present embodiment, four of the head units **13** are provided in parallel along the main scanning direction, which is a direction which is parallel with the nozzle surface **39**, in a state in which a first gap **57** (refer to FIGS. **5** and **6**) is formed between each of the head units **13**. The head units **13** are aligned with each other by being adhesively fixed to the fixing plate **14**. Note that, the fixing between the head unit **13** and the fixing plate **14** will be described later. The number of the head units **13** is not limited to four, as long as there is a plurality thereof.

As illustrated in FIG. **5**, the holder flow paths **23** which supply the ink which is introduced from the introduction needles **22** to the head unit **13** side are formed on the inner portion of the holder **12**. The upstream side of the holder flow paths **23** communicate with the needle flow paths of the introduction needles **22**, and the downstream side of the holder flow paths **23** communicate with ink introduction paths **51** of the head unit **13**. In the present embodiment, eight of the holder flow paths **23** are formed to correspond to eight of the introduction needles **22**.

As illustrated in FIG. **3**, the head unit **13** is provided with a head case **26**, and a head chip **27** which is connected to the head case **26** from below. Note that, with regard to the head case **26** in the present embodiment, since the configuration corresponding to one nozzle row **28** is horizontally symmetrical with the configuration corresponding to another nozzle row **28**, the following description will focus on the configuration corresponding to one nozzle row **28**. For convenience, the direction in which the members are laminated will be described as the vertical direction.

The head case **26** is a hollow box-shaped member in which an insertion space **50** is formed, and a flexible cable **41** (refer to FIG. **2**) is inserted through the insertion space **50**. The ink introduction path **51** is formed in the inner portion of the head case **26**. The ink introduction path **51** is a flow path for supplying the ink from the holder **12** side to a reservoir **44**, the top end thereof communicates with the holder flow path **23**, and the bottom end thereof communicates with an ink introduction port **48** (described later). A sealed space of a magnitude which does not impede the flexible deformation of a sealing film **46** is formed in a portion of the bottom surface of the head case **26** which faces a sealing portion **49** (described later).

A total of four ribs **29** are formed on the surfaces of both sides of the head case **26** in the main scanning direction. The ribs **29** protrude outward from both sides, and two are formed on each side. The ribs **29** of the present embodiment extend in a direction perpendicular to the nozzle surface **39** from the bottom end toward the top end in the height direction of the head case **26**. The ribs **29** are disposed to leave a predetermined interval therebetween in the sub-scanning direction (this corresponds to a second direction in the invention) or the nozzle row direction. The sub-scanning direction is a direction which is parallel to the nozzle surface **39** and is orthogonal to the main scanning direction. In plan view, the ribs **29** which protrude from the side surface of one side are formed shifted in the sub-scanning direction alternately from the ribs **29** which protrude from the side surface of another side (refer to FIG. **6**).

As illustrated in FIG. **4**, the head chip **27** is formed by laminating a nozzle plate **30**, a flow path substrate **31**, a piezoelectric element **32**, a protective substrate **33**, a compliance substrate **34**, and the like.

The flow path substrate **31** is formed of a silicon single crystal substrate or the like which is long along the nozzle row direction, and a thin, long communication portions **35** are formed along the longitudinal direction. A plurality of pressure chambers **36** are provided closer to the inside than the communication portions **35** so as to be parallel with the nozzle row direction. Each pressure chamber **36** communicates with a communication portion **35** via an ink supply path **37** which is formed to be narrower than the pressure chamber **36**.

The nozzle plate **30** is fixed to the bottom surface of the flow path substrate **31**, that is, the surface of the opposite side from the piezoelectric element **32** side via an adhesive, a hot melt film, or the like. The nozzle plate **30** is formed of a silicon single crystal substrate or the like which is thinner than the flow path substrate **31**, and a plurality of nozzles **38** which communicate with the respective pressure chambers **36** on the opposite side from the ink supply path **37** are provided to puncture the nozzle plate **30** along the sub-scanning direction. The nozzles **38** are provided to line up at a 360 dpi pitch, for example, and form the nozzle row **28**. Note that, the bottom surface of the nozzle plate **30** corresponds to the nozzle surface **39** in the invention.

An elastic film **40** is laminated on the top surface of the flow path substrate **31**, that is, the surface of the opposite side from the nozzle plate **30** side. Corresponding to the pressure chambers **36**, a plurality of the piezoelectric elements **32** are formed on the elastic film **40**. For example, the piezoelectric elements **32** are formed by sequentially laminating a bottom electrode film, a piezoelectric layer, and a top electrode film. One end of a lead electrode (not shown) which is conductively joined to the top electrode film is connected to an end portion of one side (the side on which a disposition space **45** (described later) is formed) of the piezoelectric element **32**. The other end of the lead electrode extends to the disposition space **45** side on an insulating film, and is electrically connected to one end of the flexible cable **41** (refer to FIG. **2**). Note that, the other end of the flexible cable **41** is connected to a control unit (not shown).

The protective substrate **33** is bonded onto the elastic film **40** and includes a piezoelectric element holding space **42** in a region which faces the piezoelectric element **32**. The piezoelectric element holding space **42** forms a space of a magnitude which does not impede the displacement of the piezoelectric element **32**. A long ink chamber **43** which penetrates the thickness direction is provided in a position which faces the communication portion **35** in the protective substrate **33**. The disposition space **45** for connecting the flexible cable **41** to the lead electrode is formed in the protective substrate **33**. The ink chamber **43** communicates with the communication portion **35** and forms the reservoir **44** which supplies the ink to the pressure chamber **36**.

The compliance substrate **34**, which is formed by laminating the flexible sealing film **46** and a fixing substrate **47** formed of a hard member such as a metal, is bonded onto the protective substrate **33**. The ink introduction port **48** which introduces the ink to the reservoir **44** penetrate the compliance substrate **34** in the thickness direction at a position corresponding to the ink introduction path **51**. Of the regions of the compliance substrate **34** facing the reservoir **44**, the region outside of the ink introduction port **48** is a sealing portion **49** which is formed of only the sealing film **46** at which the fixing substrate **47** is removed. Accordingly, the reservoir **44** is sealed by the flexible sealing film **46** and can obtain compliance.

The ink from the ink cartridges **7** is taken into the pressure chambers **36** via the introduction needles **22**, the holder flow paths **23**, the ink introduction paths **51**, the ink introduction ports **48**, the reservoirs **44**, and the ink supply paths **37**. The head unit **13** causes changes in pressure of the ink in the pressure chambers **36** by driving the piezoelectric elements **32**, and ejects the ink from the nozzles **38** which communicate with the pressure chambers **36** by using the changes in pressure.

Next, description will be given of an outer circumferential mold which fills the outer circumferences of the fixing plate **14** and each of the head units **13**. FIGS. **6**A to **6**C are plan views of the fixing plate **14** as viewed from above. FIG. **6**A is a schematic diagram illustrating the filling positions of a third outer circumferential mold **65** (this corresponds to a second filler in the invention). FIG. **6**B is a schematic diagram illustrating the filling positions of a second outer circumferential mold **64** (this corresponds to a first filler in the invention). FIG. **6**C is a schematic diagram illustrating the filling positions of a first outer circumferential mold **63**. Note that, the arrows in FIG. **6**A represent the filling positions of the third outer circumferential mold **65** in a liquid state before curing, the arrows in FIG. **6**B represent the filling positions of the second outer circumferential mold **64** in a liquid state before curing, and the arrows in FIG. **6**C represent the filling positions of the first outer circumferential mold **63** in a liquid state before curing.

The fixing plate **14** is formed of a metal such as stainless steel (SUS), and, as illustrated in FIGS. **2** and **5**, is provided with a bottom surface **17**, a first side surface **15**, and a second side surface **16**. The bottom surface **17** is fixed to the nozzle surfaces **39** of each of the head units **13**, the first side surface **15** extends from an edge of the bottom surface **17** which is positioned closer to the outside in the main scanning direction than the lined-up head units **13** to the head unit **13** side, and the second side surface **16** extends from the edge of the bottom surface **17** which is positioned on the outside in the sub-scanning direction to the head unit **13** side. In other words, the first side surface **15** and the second side surface **16** are formed to surround the outer circumference of the lined-up head units **13** from the sides of the side surfaces. Four opening portions **17***a* which expose the nozzles **38** of the head units **13** are provided in the bottom surface **17** to line up along the main scanning direction to correspond to the four lined-up head units **13**. In the present embodiment, two of the nozzle rows **28** are exposed on one of the opening portions **17***a*. Each of the head units **13** is fixed to a region other than the opening portions **17***a* of the bottom surface **17** in an aligned state using an adhesive **55**. Note that, an adhesive which has a comparatively high hardness when cured, for example, an epoxy-based resin is used as the adhesive **55** such that the position of the head unit **13** does not shift.

The first side surface **15** of the present embodiment stands substantially vertically from the bottom surface **17** along the side surfaces of the head units **13** which are positioned at the ends on both sides in the main scanning direction among the head units **13**. The second side surface **16** of the present embodiment stands substantially vertically from the bottom surface **17** along the side surfaces of both sides in the sub-scanning direction of the head units **13**. As illustrated in FIG. **5**, the first side surface **15** and the second side surface **16** extend to a position above the head chip **27** and below the unit holder **19**. As illustrated in FIGS. **6**A to **6**C, a second gap **58** is provided between the first side surface **15** and the side surfaces of the head units **13** which are positioned at the ends on both sides in the main scanning direction among the head units **13**, one at each end. A third gap **59** is provided between the second side surface **16** and the side surfaces of both sides in the sub-scanning direction of the head units **13**.

Here, a maximum interval S**2** between the head unit **13** and the first side surface **15** in the second gap **58** is narrower than a maximum interval S**1** between adjacent head units **13** in the first gap **57**. A maximum interval S**3** between the head unit **13** and the second side surface **16** in the third gap **59** is narrower than the maximum interval S**2** between the head unit **13** and the first side surface **15** in the first gap **57**. In other words, the maximum intervals S**1**, S**2**, and S**3** of the respective gaps **57**, **58**, and **59** satisfy the following expression (1).

$$S1>S2>S3 \tag{1}$$

By rendering the maximum interval S**1** of the first gap **57** wide, a liquid-state mold material does not easily creep upward due to the capillary force before curing when filling the outer circumferential mold, and the mold first gap **57** being filled with more mold material than intended is suppressed. As a result, it is possible to reduce the contraction stress which acts on the side surfaces of the head units **13** and arises when the liquid-state mold material cures. Meanwhile, since the maximum interval S**3** of the third gap **59** is reduced, the liquid-state mold material easily creeps upward due to the capillary force before curing when filling the outer circumferential mold. Therefore, the contraction stress which acts on the side surfaces of the head units **13** increases; however, since the third gap **59** is the gap is at both sides in the longitudinal direction, that is, the nozzle row direction of the head units **13**, the head units **13** do not deform easily. In other words, since the head units **13** are disposed like beams in relation to the fixing plate **14**, the influence of the contraction stress which is generated by the outer circumferential mold which is filled on the head units **13** is smaller in the third gap **59** than the first gap **57**. Therefore, it is possible to reduce the width of the maximum interval S**3** of the third gap **59** as much as possible.

Note that, it is desirable that the maximum interval S**1** between the adjacent head units **13** in the first gap **57** is approximately twice the maximum interval S**2** between the head units **13** and the first side surface **15** in the second gap **58**. Note that, the maximum interval S**1** between the adjacent head units **13** in the first gap **57** is set to 2 mm to 3 mm, and the maximum interval S**2** between the head units **13** and the first side surface **15** in the second gap **58** is set to 1 mm to 1.5 mm.

The gaps **58** and **59** between the side surfaces **15** and **16** of the fixing plate **14** and the head units **13**, and the first gap **57** between the head units **13** have sufficient intervals to be capable of adjusting the alignment to correct a misalignment of the nozzle rows **28** arising from manufacturing error or the like by translating or rotating the head units **13** when fixing the head units **13** to the bottom surface **17** of the fixing plate **14**. In other words, the gaps **57**, **58**, and **59** have intervals which are sufficient that the head unit **13** does not abut the adjacent head unit **13** or the side surface of the fixing plate **14**, even if the nozzle surface **39** of the head unit **13** abuts the bottom surface **17** of the fixing plate **14** and the head unit **13** is translated or rotated by the amount of manufacturing error in a planar direction parallel to the bottom surface **17**. For example, when the length of the nozzle row **28** is approximately 1 inch (25.4 mm), if the manufacturing error is taken into consideration, it is preferable to set a minimum interval S**4** between the head unit **13** and the first side surface **15** in the second gap **58** to 0.2 mm to 0.3 mm.

As illustrated in FIGS. **5** to **6**C, at least a portion of the first gap **57** is filled with the second outer circumferential mold **64**, and at least a portion of the second gap **58** is filled with the third outer circumferential mold **65**. Note that, in the present embodiment, as illustrated in FIGS. **5** and **6**C, the gaps are filled with the first outer circumferential mold **63** in addition to the second outer circumferential mold **64** and the third outer circumferential mold **65**. The first outer circumferential mold **63** is an outer circumferential mold which has a comparatively high hardness when cured, and the lowest layer portion of each of the gaps **57**, **58**, and **59** is filled with the first outer circumferential mold **63**. Specifically, an entire region which is below the head case **26** and is distanced from the head unit **13** of the bottom surface **17** of the fixing plate **14** (in other words, a region which is distanced from a region between the bottom surface **17** and the nozzle surface **39** which is bonded by the adhesive **55**) is filled with the first outer circumferential mold **63**. Accordingly, it is possible to strongly fix the head unit **13** and the fixing plate **14** to each other after the positioning.

As illustrated in FIGS. **5** and **6**B, above the first outer circumferential mold **63**, the gaps **57**, **58**, and **59** are filled with the second outer circumferential mold **64** which has a comparatively low hardness when cured. Specifically, the second outer circumferential mold **64** is laminated onto the first outer circumferential mold **63** across the head chip **27** and the head case **26**. The gaps **57**, **58**, and **59** are filled with the second outer circumferential mold **64** to a position which is lower than the height of the top end of the first side surface **15**. As illustrated in FIGS. **5** and **6**A, the spaces which are above the second outer circumferential mold **64** in the second gap **58** and are between the two adjacent ribs **29** which protrude from the head units **13**, which are positioned on each side in the main scanning direction among the lined-up head units **13**, toward the second gap **58** are filled with the third outer circumferential mold **65** which has a comparatively high hardness when cured. Above the second outer circumferential mold **64**, the second gap **58** is filled with the third outer circumferential mold **65** to the same height as the top end of the first side surface **15**. In other words, the second gap **58** is filled with the second outer circumferential mold **64** between the bottom surface **17** and the third outer circumferential mold **65**. The second gap **58** is filled with the third outer circumferential mold **65** in a position which is distanced further from the bottom surface **17** in a direction which is perpendicular to the bottom surface **17**, that is, in the height direction than the second outer circumferential mold **64** in the first gap **57**.

Note that, for example, an epoxy-based adhesive is used as the mold material which is used in the first outer circumferential mold **63** and the third outer circumferential mold **65**. For example, a silicon-based adhesive is used as the mold material which is used in the second outer circumferential mold **64**. Additionally, any adhesive may be used as long as the hardness of the second outer circumferential mold **64** is lower than that of the first outer circumferential mold **63** and the third outer circumferential mold **65** when cured.

Next, description will be given of the filling method of the first outer circumferential mold **63**, the second outer circumferential mold **64**, and the third outer circumferential mold **65**. First, the nozzle surfaces **39** of the head units **13** and the bottom surface **17** are adhered to each other using the adhesive **55** in a state in which the head units **13** are aligned in relation to the fixing plate **14**. Note that, for example, using a camera or the like, the alignment of the fixing plate **14** and the head unit **13** is performed by viewing the relative positions of the nozzles **38** which are positioned on both ends of the nozzle rows **28** and an alignment mark which is provided in advance on the fixing plate **14** or on a jig which holds the fixing plate **14**, an alignment mark which is displayed in an image which is captured by a camera, or the like, and aligning the positions of the nozzles **38** and the alignment mark. In this state, the nozzle surfaces **39** of the head units **13** and the fixing plate **14** are fixed to each other via the adhesive **55**. Next, as illustrated by the arrows of FIG. **6**C, mold material dispenser needles (hereinafter simply referred to as needles) are inserted into the first gaps **57** and the second gaps **58**, and a liquid-state mold material which forms the first outer circumferential mold **63** is injected. The injected liquid-state mold material also flows to the third gap **59** side, and the gaps **57**, **58**, and **59** are filled. The liquid-state mold material is left for a predetermined time until the mold material cures (or solidifies) to form the first outer circumferential mold **63**.

As illustrated in FIG. **6**B, if the first outer circumferential mold **63** is cured, needles are inserted into the first gaps **57** and the second gaps **58** in the same manner, and a liquid-state mold material which forms the second outer circumferential mold **64** is injected. The injected liquid-state mold material also flows to the third gap **59** side by passing beneath the ribs **29**, and the gaps **57**, **58**, and **59** are filled. The liquid-state mold material is left for a predetermined time until the mold material cures (or solidifies) to form the second outer circumferential mold **64**.

As illustrated in FIG. **6**A, if the second outer circumferential mold **64** is cured, needles are inserted between the ribs **29** in the second gaps **58**, and a liquid-state mold material which forms the third outer circumferential mold **65** is injected. Here, an interval S4 between the rib **29** of the head unit **13** and the first side surface **15** in the second gap **58** is set to be an interval from which the liquid-state mold material does not exceed the rib **29** and spill over to the third gap **59** side due to the capillary force. Accordingly, only the space between the ribs **29** in the second gap **58** is filled with the mold material which forms the third outer circumferential mold **65**. In the present embodiment, above the second outer circumferential mold **64**, the mold material which forms the third outer circumferential mold **65** is used to fill to the same position as the height of the first side surface **15** of the fixing plate **14**. Finally, by leaving the liquid-state mold material for a predetermined time until the mold material cures (or solidifies) to form the third outer circumferential mold **65**, it is possible to create the recording head **3** which is described above. Note that, when a UV curing adhesive is used for the outer circumferential molds, the liquid state mold material is cured by being irradiated with UV.

In this manner, since the second gap **58** is filled with the third outer circumferential mold **65** which has a higher hardness in a position which is distanced further from the bottom surface **17** than the second outer circumferential mold **64** which has a lower hardness, even if an external force is applied to the first side surface **15** due to a collision or the like of the recording medium **2**, it is possible to suppress the warping of the first side surface **15**. In other words, it is possible to suppress the moment which is applied to the fixing plate **14**. Accordingly, it is possible to suppress the stress on the bottom surface **17** which arises due to the warping of the first side surface **15**, and it is possible to suppress the damage to the nozzle surfaces **39** which are fixed to the bottom surface **17**. Meanwhile, since the first gap **57** is filled with the second outer circumferential mold **64** which has a lower hardness without being filled with the third outer circumferential mold **65** which has a higher hardness, it is possible to suppress the deformation of the fixing plate **14** and the head unit **13** which is caused by the contraction force which arises when the liquid-state mold material in the first gap **57** cures to form the second outer circumferential mold **64**. As a result, it is possible to suppress the misalignment of the head unit **13** and the damage to the nozzle surface **39**. In the present embodiment, since the second gap **58** is filled with the second outer circumferential mold **64** between the third outer circumferential mold **65** and the bottom surface **17**, it is possible to further suppress the deformation of the fixing plate **14** and the head unit **13** which is caused by the contraction force which arises when the liquid-state mold material in the second gap **58** cures. As a result, it is possible to further suppress the misalignment of the head unit **13** and the damage to the nozzle surface **39**.

Since the maximum interval S**2** of the second gap is narrower than the maximum interval S**1** of the first gap **57**, it is possible to fill the second gap **58** to a position which is distanced further from the bottom surface **17** with the liquid-state mold material which forms the third outer circumferential mold **65** due to the capillary force which arises when the second gap **58** is filled with the third outer circumferential mold **65**. Since the second gap **58** is narrow, it is possible to reduce the warp amount even if the first side surface **15** warps to the head unit **13** side. Since the maximum interval S**3** of the third gap **59** is narrower than the maximum interval S**2** of the second gap **58**, it is possible to reduce the size of the fixing plate **14** in the sub-scanning direction. Accordingly, it is possible to suppress the collision of the recording medium **2** into the fixing plate **14**, and thus, it is possible to suppress the damage to the nozzle surfaces **39**.

Since the head unit **13** includes at least two adjacent ribs **29** which protrude toward the second gap **58** with an interval between the ribs **29** in the sub-scanning direction, it is possible to define the filling range in the sub-scanning direction of the third outer circumferential mold **65** using the space between the ribs **29**. Accordingly, when the second gap **58** is filled with the third outer circumferential mold **65**, it is possible to suppress the spilling over of the liquid-state mold material to the outside of the filling range. As a result, it is possible to suppress the filling of the outside of the second gap **58** with the third outer circumferential mold **65** which has a high hardness and in which the contraction force which arises when curing is great, and it is possible to suppress the deformation of the fixing plate **14** and the head unit **13** which arises from the contraction force of the mold material. Since the rib **29** which protrudes from one side is formed to be distanced from the rib **29** which protrudes from the other side in the sub-scanning direction, it is possible to prevent the ribs **29** of the adjacent head units **13** from interfering with each other when the head units **13** are lined up in the main scanning direction. Accordingly, it is possible to reduce the size of the first gap **57** between the head units **13**, and thus, it is possible to miniaturize the recording head **3**.

Note that, the injection positions of the second outer circumferential mold **64** are not limited to those described in the embodiment. For example, a configuration may be adopted in which the needles are inserted into only the second gap **58**, the liquid-state mold material which forms the second outer circumferential mold **64** is injected from the second gap **58** and flows to the first gap **57** via the third gap **59**. If such a configuration is adopted, since it is possible to reduce the number of injection positions of the liquid-state mold material, the filling task of the second outer circumferential mold **64** becomes simple.

Incidentally, in the first embodiment described above, the first gap **57**, the second gap **58**, and the third gap **59** are each filled with the second outer circumferential mold **64**; however, the invention is not limited thereto. For example, in the second embodiment, only the first gap **57** is filled with the second outer circumferential mold **64**.

FIG. **7** is a cross sectional diagram of the main parts of the recording head **3** in the second embodiment. FIGS. **8**A to **8**C are plan views of the fixing plate **14** in the second embodiment as viewed from above. FIG. **8**A is a schematic diagram illustrating the filling positions of the third outer circumferential mold **65**. FIG. **8**B is a schematic diagram illustrating the filling positions of the second outer circumferential mold **64**. FIG. **8**C is a schematic diagram illustrating the filling positions of the first outer circumferential mold **63**. Note that, the arrows in FIG. **8**A represent the filling positions of the third outer circumferential mold **65** in a liquid state before curing, the arrows in FIG. **8**B represent the filling positions of the second outer circumferential mold **64** in a liquid state before curing, and the arrows in FIG. **8**C represent the filling positions of the first outer circumferential mold **63** in a liquid state before curing.

As illustrated in FIGS. **7** and **8**C, the first outer circumferential mold **63** which has a comparatively high hardness when cured, and the lowest layer portion of each of the gaps **57**, **58**, and **59** is filled with the first outer circumferential mold **63** in the same manner as in the first embodiment. As illustrated in FIGS. **7** and **8**B, the second outer circumferential mold **64** which has a comparatively low hardness when cured is used to fill the first gap **57** above the first outer circumferential mold **63**. In other words, while the first gap **57** is filled with the second outer circumferential mold **64** on top of the first outer circumferential mold **63**, the second outer circumferential mold **64** is not laminated on the second gap **58** and the third gap **59**. As illustrated in FIGS. **7** and **8**A, the third outer circumferential mold **65** which has a comparatively high hardness when cured is laminated on the first outer circumferential mold **63** between the ribs **29** in the second gap **58**. Here, since the maximum interval S**2** of the second gap **58** is narrower than the maximum interval S**1** of the first gap **57**, the third outer circumferential mold **65** is used to fill to a higher position than the second outer circumferential mold **64** due to the capillary force which arises when filling. In the present embodiment, while the third outer circumferential mold **65** is used to fill to the same height as the height of the top end of the first side surface **15** of the fixing plate **14**, the second outer circumferential mold **64** is used to fill to a position which is lower than the height of the top end of the first side surface **15** of the fixing plate **14**. Note that, since the other configuration is the same as in the first embodiment described above, description thereof will be omitted.

Next, description will be given of the filling method of the first outer circumferential mold **63**, the second outer circumferential mold **64**, and the third outer circumferential mold **65** in the second embodiment. First, in the same manner as the first embodiment, the nozzle surfaces **39** of the head units **13** and the bottom surface **17** are adhered to each other using the adhesive **55** in a state in which the head units **13** are aligned in relation to the fixing plate **14**. Next, as illustrated by the arrows of FIG. **8**C the needles are inserted into the first gaps **57** and the second gaps **58**, and a liquid-state mold material which forms the first outer circumferential mold **63** is injected. The injected liquid-state mold material also flows to the third gap **59** side, and the gaps **57**, **58**, and **59** are filled. The liquid-state mold material is left for a predetermined time until the mold material cures (or solidifies) to form the first outer circumferential mold **63**.

As illustrated in FIG. **8**B, if the first outer circumferential mold **63** is cured, needles are inserted into the first gaps **57**, and a liquid-state mold material which forms the second outer circumferential mold **64** is injected. At this time, the amount of the liquid-state mold material to inject is reduced and the flowing to the third gap **59** side is suppressed. Note that, it is possible to suppress the flowing of the mold material to the third gap **59** side using the ribs **29** by filling the gap between the first outer circumferential mold **63** and the ribs **29** with more of the first outer circumferential mold **63** than in the first embodiment. By leaving the liquid-state mold material for a predetermined time until the mold material cures (or solidifies) to form the second outer circumferential mold **64**, the second outer circumferential mold **64** is formed in the first gap **57**.

As illustrated in FIG. **8**A, if the second outer circumferential mold **64** is cured, needles are inserted between the ribs **29** in the second gaps **58**, and a liquid-state mold material which forms the third outer circumferential mold **65** is injected. Even in the present embodiment, the interval S4 between the rib **29** of the head unit **13** and the first side surface **15** in the second gap **58** is set to a magnitude at which the liquid-state mold material does not exceed the rib **29** and spill over to the third gap **59** side due to the capillary force. Therefore, only the space between the ribs **29** in the second gap **58** is filled with the mold material which forms the third outer circumferential mold **65**. Above the first outer circumferential mold **63**, the mold material which forms the third outer circumferential mold **65** is used to fill to the same position as the height of the top end of the first side surface **15** of the fixing plate **14**. Finally, by leaving the liquid-state mold material for a predetermined time until the mold material cures (or solidifies) to form the third outer circumferential mold **65**, it is possible to create the recording head **3** in the second embodiment.

In this manner, in the present embodiment, since the second gap **58** is filled with the third outer circumferential mold **65** which has a higher hardness, even if an external force is applied to the first side surface **15** due to a collision or the like of the recording medium **2**, it is possible to suppress the warping of the first side surface **15**. Accordingly, it is possible to suppress the stress on the bottom surface **17** which arises due to the warping of the first side surface **15**, and it is possible to suppress the damage to the nozzle surfaces **39** which are fixed to the bottom surface **17**. Meanwhile, since the first gap **57** is filled with the second outer circumferential mold **64** which has a lower hardness, it is possible to suppress the deformation of the fixing plate **14** which is caused by the contraction force which arises when the liquid-state mold material in the first gap **57** cures to form the second outer circumferential mold **64**. As a result, it is possible to suppress the misalignment of the head unit **13** and the damage to the nozzle surface **39**. Since the third gap **59** is further narrowed, it is possible to reduce the size of the fixing plate **14** in the second direction. Accordingly, it is possible to suppress the collision of the recording medium **2** into the fixing plate **14**, and thus, it is possible to suppress the damage to the nozzle surfaces **39**.

In this manner, since the second gap **58** is filled with the third outer circumferential mold **65** in a position which is distanced further from the bottom surface **17** than the second outer circumferential mold **64**, even if an external force is applied to the first side surface **15** due to a collision or the like of the recording medium **2**, it is possible to further suppress the warping of the first side surface **15**. Since the second outer circumferential mold **64** is used to fill a position which is lower than the third outer circumferential mold **65**, that is, a position close to the bottom surface **17**, it is possible to further reduce the contraction stress which acts on the side surfaces of the head units **13** and arises when the liquid-state mold material cures.

Incidentally, in the embodiments described above, the ribs **29** are provided on each of the head units **13**; however, the invention is not limited thereto. A configuration may be adopted in which adjacent ribs protruding toward the second gap are provided in at least the head units which are positioned at the ends in the main scanning direction, among the lined-up head units. The number of the ribs **29** is not limited to two, and three or more may be provided. In other words, if an interval is formed between the ribs only in the regions which are filled with the third outer circumferential mold, it is possible to provide the ribs in other regions, that is, regions other than the regions which are filled with the third outer circumferential mold. By providing a plurality of ribs in this manner, it is possible to further suppress the flowing of the liquid-state mold material which forms the third outer circumferential mold into the third gap side, and to secure the strength of the head case using the ribs.

In the above description, description was given exemplifying an ink jet recording head **3** which is a type of the liquid ejecting head; however, the invention can also be applied to other liquid ejecting heads in which a configuration is adopted in which a plurality of head units are fixed to a fixing plate. For example, it is possible to apply the invention to a color material ejecting head which is used in the manufacture of a color filter of a liquid crystal display or the like, an electrode material ejecting head which is used in forming electrodes of an organic electro luminescence (EL) display, a face emission display (FED), and the like, a bio-organic matter ejecting head used in the manufacture of bio chips (biochemical elements), and the like.

What is claimed is:

1. A liquid ejecting head, comprising:

a head unit configured to eject a liquid from a nozzle which is formed on a nozzle surface;

a fixing plate which includes a bottom surface and a first side surface, the bottom surface fixed to the nozzle surface of each of a plurality of the head units which are provided to line up in a state in which a first gap is remained along a first direction parallel to the nozzle surface, the first side surface extending to the head unit side from an edge of the bottom surface positioned closer to an outside in the first direction than the lined-up head units, and in which a second gap is remained between the first side surface and the head units which are positioned at ends in the first direction among the head units;

a first filler which fills at least a portion of the first gap; and

a second filler which fills at least a portion of the second gap,

wherein the second filler fills the second gap at a position which is distanced further from the bottom surface than the first filler in a direction which is perpendicular to the bottom surface, and

wherein a hardness of the second filler is higher than a hardness of the first filler.

2. The liquid ejecting head according to claim **1**,

wherein a maximum interval between the head unit and the first side surface in the second gap is narrower than a maximum interval between adjacent head units in the first gap.

3. The liquid ejecting head according to claim **1**,

wherein the fixing plate includes a second side surface which extends to the head unit side in a state in which a third gap is formed in a space from an edge of the bottom surface, which is positioned closer to an outside than the head unit in a second direction which is parallel with the nozzle surface and orthogonal to the first direction, to the head units, and

wherein a maximum interval between the head units and the second side surface in the third gap is narrower than a maximum interval between the head units and the first side surface in the second gap.

4. The liquid ejecting head according to claim **1**,

wherein, among the lined-up head units, at least the head units which are positioned at ends in the first direction include at least two adjacent ribs protruding toward the second gap to leave an interval in a second direction which is parallel with the nozzle surface and orthogonal to the first direction.

5. The liquid ejecting head according to claim 4,

wherein the head unit includes at least two ribs protruding outward from each side in the first direction to leave an interval in the second direction, and

wherein the ribs protruding from one side are formed to be shifted in the second direction in relation to the ribs protruding from other side.

6. The liquid ejecting head according to claim 1,

wherein a space between the second filler and the bottom surface in the second gap is filled with the first filler.

7. The liquid ejecting head according to claim 6,

wherein the first filler is injected from the second gap to fill the first gap and the second gap.

8. A liquid ejecting head, comprising:

a head unit configured to eject a liquid from a nozzle which is formed on a nozzle surface;

a fixing plate which includes a bottom surface, a first side surface and a second side surface, the bottom surface fixed to the nozzle surface of each of a plurality of the head units which are provided to line up in a state in which a first gap is remained along a first direction parallel to the nozzle surface, the first side surface extending to the head unit side from an edge of the bottom surface which is positioned closer to an outside in the first direction than the lined-up head units, and the second side surface extending to the head unit side from an edge of the bottom surface which is positioned closer to an outside in a second direction parallel to the nozzle surface and orthogonal to the first direction, and in which a second gap is remained between the first side surface and the head units which are positioned at ends in the first direction among the head units, and in which a third gap is remained between the second side surface and the head units;

a first filler which fills at least a portion of the first gap; and

a second filler which fills at least a portion of the second gap,

wherein a maximum interval between the head units and the second side surface in the third gap is narrower than a maximum interval between the head units and the first side surface in the second gap, and

wherein a hardness of the second filler is higher than a hardness of the first filler.

9. The liquid ejecting head according to claim 8,

wherein, among the lined-up head units, at least the head units which are positioned at ends in the first direction include at least two adjacent ribs protruding toward the second gap to leave an interval in the second direction.

10. The liquid ejecting head according to claim 9,

wherein the head unit includes at least two ribs protruding outward from each side in the first direction to leave an interval in the second direction, and

wherein the ribs protruding from one side are formed to be shifted in the second direction in relation to the ribs protruding from other side.

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